DOCUMENT RESUME

ED 064 760 EA 004 333

TITLE	Minimum Standards for School Buses, Revised. Recommendations of National Conference on School Transportation (Washington, D. C., May 4-7, 1970).
SPONS AGENCY	Florida State Dept. of Education, Tallahassee.; National Commission on Safety Education, Washington, D.C.
PUB DATE	70
NOTE	79p.
AVAILABLE FROM	Publications and Textbook Services, Florida State Department of Education, Bureau of Curriculum and Instruction, Tallahassee, Florida 32304 (Free)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Accident Prevention; Cost Effectiveness; *Equipment Standards; *Federal Laws; Mechanical Equipment; Performance Specifications; *Safety; *School Buses; State Boards of Education; *State Standards; Student Transportation
IDENTIFIERS	Interstate Cooperation

ABSTRACT

This booklet contains the revised minimum standards put into effect and enforced beginning with new school bus models that appeared after January 1, 1972. These standards apply to (1) conventional type body-on-chasis vehicles having a seating capacity of 24 or more pupils; (2) conventional type body-on-chasis vehicles that are less than 96 inches in width and having a seating capacity of from 16-23 pupils; (3) transit and metropolitan type vehicles having a seating capacity of 24 or more pupils; and (4) converted small vehicles (including station wagons, suburbans, and van-type vehicles) having a seating capacity of 1-16 pupils. A related document is EA 004 334. (Author)

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ED 064760

MINIMUM STANDARDS FOR SCHOOL BUSES

1970 Revised Edition

Recommendations of

NATIONAL CONFERENCE ON SCHOOL TRANSPORTATION

NEA Education Center, Washington, D. C. May 4-7, 1970

Co-sponsored by:

American Association of School Administrators
Association of State Directors of Pupil
Transportation Services
Council of Chief State School Officers
Florida Department of Education
National Commission on Safety Education, NEA
Rural Education Association
U. S. Office of Education

Administered by

National Commission on Safety Education
National Education Association
1201 Sixteenth Street, N. W.
Washington, D. C. 20036

and

State of Florida, Department of Education
Floyd T. Christian, Commissioner of Education
Tallahassee, Florida 32304

EA 004 333

(The 1970 National Conference on School Transportation also adopted recommendations published under the title "Standards for School Bus Operation".)

The 1970 National Conference on School Transportation adopted recommendations designed to further the safety and efficiency with which pupils are transported. The publications are:

(a) Minimum Standards for School Buses, 1970 Revised Edition
(b) Standards for School Bus Operation

These publications are available from State of Florida, Department of Education, Floyd T. Christian, Commissioner of Education, Bureau of Curriculum and Instruction, Publications and Textbook Services, Tallahassee, Florida 32304. Price information available upon request.

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FOREWORD

The 1970 National Conference on School Transportation was the latest in a series beginning in 1939 and continuing in 1945, 1948, 1951, 1954, 1959, and 1964. All Conferences have been made up of official representatives of state departments of education and advisors from industry and from other interested professional organizations and groups. Each Conference has resulted in one or more publications containing the recommendations of that particular Conference.

The recommendation of standards for school buses has been a major purpose of all of these Conferences. The 1939 Conference was called for this sole purpose and formulated a set of recommended standards for school buses of 20 or more passengers. The 1945 Conference revised these standards and added standards for small vehicles of 10 to 18 passengers, both of which were further revised by the 1948 Conference. In 1951, an Interim Conference formulated tentative standards for transit and metropolitan types of school buses, and these were incorporated in the revised standards that came out of the 1954 Conference. There were further revisions in 1959, and the 1964 Conference added standards for school buses to be used in transporting handicapped children. In addition to revising standards for larger vehicles, the 1970 Conference refined the standards for school buses designed to transport fewer than 24 passengers.

Other major problems in pupil transportation have received attention at these National Conferences. On several occasions, recommendations concerned primarily with the overtaking and passing of school buses were transmitted to the National Committee on Uniform Traffic Laws and Ordinances for consideration in connection with revisions of the Uniform Vehicle Code. The 1948 Conference made recommendations on uniform records and reports for pupil transportation. The major purpose of the 1948 Conference was the formulation of recommendations related to standards and training programs for school bus drivers. These recommendations were revised by the 1959 Conference, and a new publication on this topic was issued. The 1954 Conference gave considerable time to the discussion of the extended use of school buses in the school program. The 1970 Conference also adopted Standards for School Bus Operation (issued in a separate report).

With the enactment in 1966 of the National Traffic and Motor Vehicle Safety Act, the federal government was given responsibility for developing and promulgating motor vehicle safety standards applicable to motor vehicles sold in the United States. Whenever such standards either differ from, go beyond, or are in addition to, the standards adopted by the 1970 National Conference, they automatically apply to school buses sold in all states.

Funds granted to the Florida Department of Education by the U. S. Office of Education for a project entitled "National Project on State Responsibility in School Transportation" (provided under Title 505, Elementary and

Secondary Education Act) helped make possible the holding of the 1970 National Conference and the issuance of this report.

James A. Sensenbaugh, Conference Chairman
and State Superintendent of Schools
Baltimore, Maryland

OBJECTIVES AND GUIDING PRINCIPLES

Since the first National Conference on school bus standards in 1939, certain objectives and guiding principles have had a vital role in the development of the minimum standards for school buses. These objectives and guiding principles have been reaffirmed and emphasized at the subsequent National Conferences. The two major objectives, safety and economy, along with the following principles, have served as guide-posts for making decisions on the minimum standards and in arriving at sound and common agreement.

Objectives

The transportation of pupils in safety and comfort on safe, economical vehicles can be assured through adequate state regulations governing school bus construction.

Safety includes all those factors relating to the school bus construction which may directly or indirectly affect the safety and welfare of pupils transported.

Economy includes the construction, procurement, operation, and maintenance of school buses consistent with the safety and welfare of the pupils.

Guiding Principles

1. Uniform state school bus standards should
   a. be consistent with the objectives of safety and economy
   b. eliminate the construction of unsafe buses
   c. reduce conflicting standards wherever possible among states in the interest of production efficiency
   d. specify exact dimensions where necessary to increase the effeciency of volume production
   e. eliminate unnecessary luxury consistent with the safety and welfare of pupils transported
2. Any adaptation of the nationally recommended minimum standards should be made by the states only in order to permit desirable adjustments to local needs and only when such adaptations do not
   a. basically conflict with the recommended national minimum standards

b. otherwise unduly increase production costs

3. Uniform state standards for school buses should specify results desired in terms of safety and economy, and these performance specifications must be defined when this is necessary to make the regulations enforceable.

4. Provisions should be made for periodic review and revision of uniform state standards for school buses through cooperation of the states.

5. Uniform state standards for school buses should permit opportunities for the use of new inventions and improvements which are consistent with safety and economy.

6. Uniform state standards for school bus construction should provide for a degree of flexibility within which sound construction is possible (consistent with safety and economy) to accommodate the various manufacturers.

7. Uniform state standards for school bus construction should recognize that the actual designing of school buses is a responsibility of the manufacturers.

8. The current national minimum standards for school buses are considered in full force and effect as recommendations to the states. Revisions of these standards are made only when evidence indicates that such revisions are needed.

USING THESE MINIMUM STANDARDS FOR SCHOOL BUSES

In order that these minimum standards for school buses may be put into effect, each state legislature which has not already done so should confer upon the state department of education the general responsibility for setting up statewide rules and regulations regarding the construction of school bus chassis, bodies, and equipment. In no instance, however, should the detailed standards for school buses be written into the state law.

The minimum standards for school buses appearing in this report must be officially adopted by a state to become legally effective within that state.

These minimum standards for school buses are intended to apply primarily to new vehicles purchased after the effective date of the revised standards. Any state considering making the standards applicable to vehicles purchased previously must consider carefully the economic effects of such retroactive action.

These minimum standards are intended to apply to all types of school buses: (a) conventional type body-on-chassis vehicles having a seating capacity of 24 or more pupils; (b) conventional type body-on-chassis vehicles

which are less than 96 inches in width and which have a seating capacity of 16 up to (and including) 23 pupils; (c) transit and metropolitan types of vehicles having a seating capacity of 24 or more pupils; and (d) converted small vehicles (including station wagons, surburbans, and van type vehicles) having a seating capacity of up to and including 16 pupils.

These minimum standards are not intended to apply to buses used primarily as public carriers rather than to transport pupils to and from school.

These revised minimum standards should be put into effect and enforced by states beginning with those new school bus models which appear after January 1, 1972.

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MINIMUM STANDARDS FOR SCHOOL BUSES

The Bus Chassis

Air Cleaner –

Bus shall be equipped with adequate oil-bath, dry-element, or equivalent air cleaner mounted outside passenger compartment.

Axles –

1. Front axle or other type of suspension assembly shall be of sufficient capacity at ground to support such load on front axle as would be imposed by actual average gross vehicle weight.

2. Rear axle shall be full-floating type. Rear axle or other type of suspension assembly shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by rear suspension assembly.

Exceptions – transit and metropolitan vehicles

1. Front axle shall be wide-track, heavy-duty bus type or shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by front axle.

2. Rear axle shall be full-floating, heavy-duty bus type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by rear axle.

Exception – small vehicles

1. Rear axle may be semi-floating.

Battery –

1. Storage battery, as established by manufacturer's rating, shall be of sufficient capacity to care for starting, lighting, signal devices, heating, and other electrical equipment.

2. Bus shall be equipped with battery of at least 70 ampere hours at 12 volts, measured at 20-hour rate.

3. When battery is to be mounted outside of engine compartment, it may be temporarily mounted to chassis. Body company will permanently mount battery on sliding tray located so that center line of battery is 52 inches back of cowl. One-piece battery cables shall be provided by chassis manufacturer, such cables to be at least 36 inches longer than normally required, to accommodate battery when located 52 inches to rear of cowl.

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Exception – small vehicles

1. Item 3 does not apply. See also page 30.

Brakes –

1. Four-wheel brakes, adequate at all times to control bus when fully loaded, shall be provided in accordance with Federal Motor Vehicle Safety Standards.[1]

   a. Stopping ability of service brake system. Service brake system shall be designed and constructed so that by application of single control unit vehicle can be stopped within distances specified in (1) and (2), below. Stopping distance requirement tests shall be conducted in accordance with SAE J658[2] and with vehicle loaded (MGVW – manufacturer's gross vehicle weight).

      (1) Brakes shall be designed to have capability of developing deceleration of 14 fpsps (feet per second per second) from speed of 20 mph at pedal effort of not more than 75 pounds.

      (2) Stopping distance test with brakes cold shall be conducted after proper conditioning according to SAE J880[3] and vehicle shall stop, from speed of 20 mph, within following distances at pedal effort of not more than 200 pounds:

         (a) 10,000 pounds GVW and under ---- 25 feet

         (b) Over 10,000 pounds GVW ---------- 35 feet

      (3) Brake balance shall be such that, when tested at speed of 20 mph under any normal condition of loading within MGVW (manufacturer's gross vehicle weight), deceleration of 12 fpsps (feet per second per second) can be achieved without locking wheels on any axle.

   b. Energy absorption – horsepower rating. Energy absorption capability of brakes, when tested in accordance with procedure established by SAE J880 or equivalent, shall be not less than 12 + ~~1.4 GVW / 1000~~ 1.4 GVW / 1000

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[1]Issued by National Highway Safety Bureau, Federal Highway Administration, U. S. Department of Transportation, Washington, D. C. 20591

[2]Service Brake Performance, recommended practice of Society of Automotive Engineers.

[3]Brake Rating System Test Code – Commercial Vehicles, recommended practice of Society of Automotive Engineers.

c. Travel reserve of air brake actuator or hydraulic brake pedal. Brake actuator travel, when measured statically at actuating force required for compliance with Item 1a(2) above, shall be not more than 60 percent of available travel.

d. Reservoirs required. Every brake system which employs air or vacuum shall include following reservoir capacity:

(1) Air brake system shall have reservoir capacity which is equal to or greater than 12 times total volume of all brake actuators at full travel.

(2) Vacuum brake system shall have reservoir used exclusively for brakes, with capacity of not less than 1,000 cubic inches, and shall be adequate to insure loss in pressure at full stroke application of not more than 30 percent.

(3) Brake system shall include suitable and convenient connection for installation of separate vacuum reservoir with capacity of not less than 1,000 cubic inches, furnished and installed by body manufacturer and protected by check valve, for actuation of other vacuum-powered accessories. Engine shall be protected by proper filters.

e. Lines supplying power to air or vacuum system reservoirs shall be safeguarded through proper design and bracing to protect from excessive heat and vibration. Brake system reservoir shall be "so safeguarded by a check valve or equivalent device that in the event of failure or leakage in its connection to the source of compressed air or vacuum, the stored air or vacuum shall not be depleted by the lack or failure."[4] Means shall be provided to establish air check valve to be in working order.[5]

f. Gauges. A vehicle using air with illuminated gauge, accurate to within 10 percent of actual reservoir pressure, which will indicate to driver, in case of

(1) air brakes: pressure in psi (pounds per square inch) which is available for operation of brakes; or

(2) vacuum brakes: vacuum in inches of mercury which is available for operation of brakes.

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[4]Uniform Vehicle Code, 1968 revision, Section 12-301, (i), 3.

[5]Motor Carrier Safety Regulations, as amended to January 1, 1968, Paragraph 393.50, (b). Issued by Bureau of Motor Carrier Safety, U. S. Department of Transportation, Washington, D. C. 20591.

g. Warning devices. In addition to gauges required in f above, vehicle shall be equipped with warning signal, readily audible or visible to driver, which will give continuous warning to driver when, in case of

(1) air brakes: air pressure in system available for braking is 60 psi (pounds per square inch) and less; or

(2) vacuum brakes: vacuum in system available for braking is 8 inches of mercury and less.

2. Emergency stopping system:

a. General. Brake system(s) shall perform emergency stopping function and be so designed and constructed that single failure anywhere in brake system which performs service brake function, excepting mechanical parts of wheel brake assemblies and brake and brake pedal attachment to brake valve(s) or master cylinder(s), will not leave vehicle without operative brakes capable of stopping vehicle when loaded up to and including manufacturer's rated GVW (gross vehicle weight) at any legal speed and in accordance with requirements of b and c, below.

b. Emergency stopping performance requirements. Following performance shall be obtained under road and test conditons outlined in 1 a above:

(1) Vehicle, when loaded to manufacturer's GVW (gross vehicle weight) capacity, shall be brought to stop from speed of 20 mph in measured distance of 85 feet or as may be modified by the Federal Motor Vehicle Safety Standards.

(2) Deceleration of not less than 6 fpsps (feet per second per second) shall be maintained throughout stop from 20 mph.

c. Control requirements of emergency stopping system. Control of emergency stopping system shall be designed and constructed:

(1) to permit modulated control by driver of brake application and release; and

(2) to prevent release of brakes on air brake models by driver unless energy is available for re-application.

3. Parking brakes:

Parking brake system shall be designed and constructed to meet following requirements:

a. Parking brake shall hold vehicle stationary, or to limit of traction of braked wheels, on 20-percent grade under any condition of legal loading and on surface free from snow, ice, and loose material.

b. When applied, parking brake shall remain in applied position with capability set forth in 3 a above, despite exhaustion of source of energy used for application or despite leakage of any kind.

Exception – small vehicles

Items 1 f and 1 g do not apply.

Item 2 c (2) does not apply.

Bumper, front –

1. Front bumper shall be furnished by chassis manufacturer as part of chassis and shall meet Federal Motor Vehicle Safety Standards.

2. Front bumper must extend to outer edges of fenders at bumper top line (to assure maximum fender protection) and be of sufficient strength to permit pushing vehicle of equal gross weight without permanent distortion to bumper, chassis, or body.

Exceptions

1. Transit and metropolitan vehicle front bumpers shall be furnished by body manufacturer.

2. Small vehicle rear bumpers shall be furnished by chassis manufacturer.

Certification –

Chassis manufacturers will, upon request, certify to state departments of education that their product meets minimum standards on following items unless covered by certification issued under requirements of National Traffic and Motor Vehicle Safety Act:

1. axles

2. brakes

3. exhaust system noise level

4. horn

5. power and gradeability

6. springs.

Clutch –

All chassis of 48- through 60-pupil capacity having mechanical type transmission shall be equipped with clutch of 12-inch minimum diameter. Chassis of 66 and greater pupil capacity having mechanical type transmission shall be equipped with clutch of 13-inch minimum diameter or clutch of equivalent performance.

Color –

Chassis, including wheels and front bumper, shall be black;[6] hood, cowl, and fenders shall be in national school bus chrome.[7] (See Appendix).

Drive shaft –

Drive shaft shall be protected by metal guard or guards to prevent it from whipping through floor or dropping to ground if broken.

Electrical system –

1. Battery – see pages 11, 30.

2. Generator or alternator – see page 21.

3. Lamps and signals – see page 45.

4. Wiring – see page 56.

5. Chassis manufacturer shall install readily accessible electrical terminal so that body and chassis electrical load can be recorded through chassis ammeter without dismantling or disassembling chassis component. Chassis wiring system to terminal shall have minimum 100-ampere capacity. Chassis ammeter and wiring shall be compatible with generating capacity, and ammeter shall be capable of recording continuous draw of 100 amperes.

Exhaust system –

1. Exhaust pipe, muffler, and tailpipe shall be outside bus body compartment and attached to chassis.

2. Tailpipe shall be constructed of seamless or electrically welded tubing of 16-gauge steel or equivalent and shall extend at least 5 inches beyond chassis frame. (See Tailpipe, page 54.)

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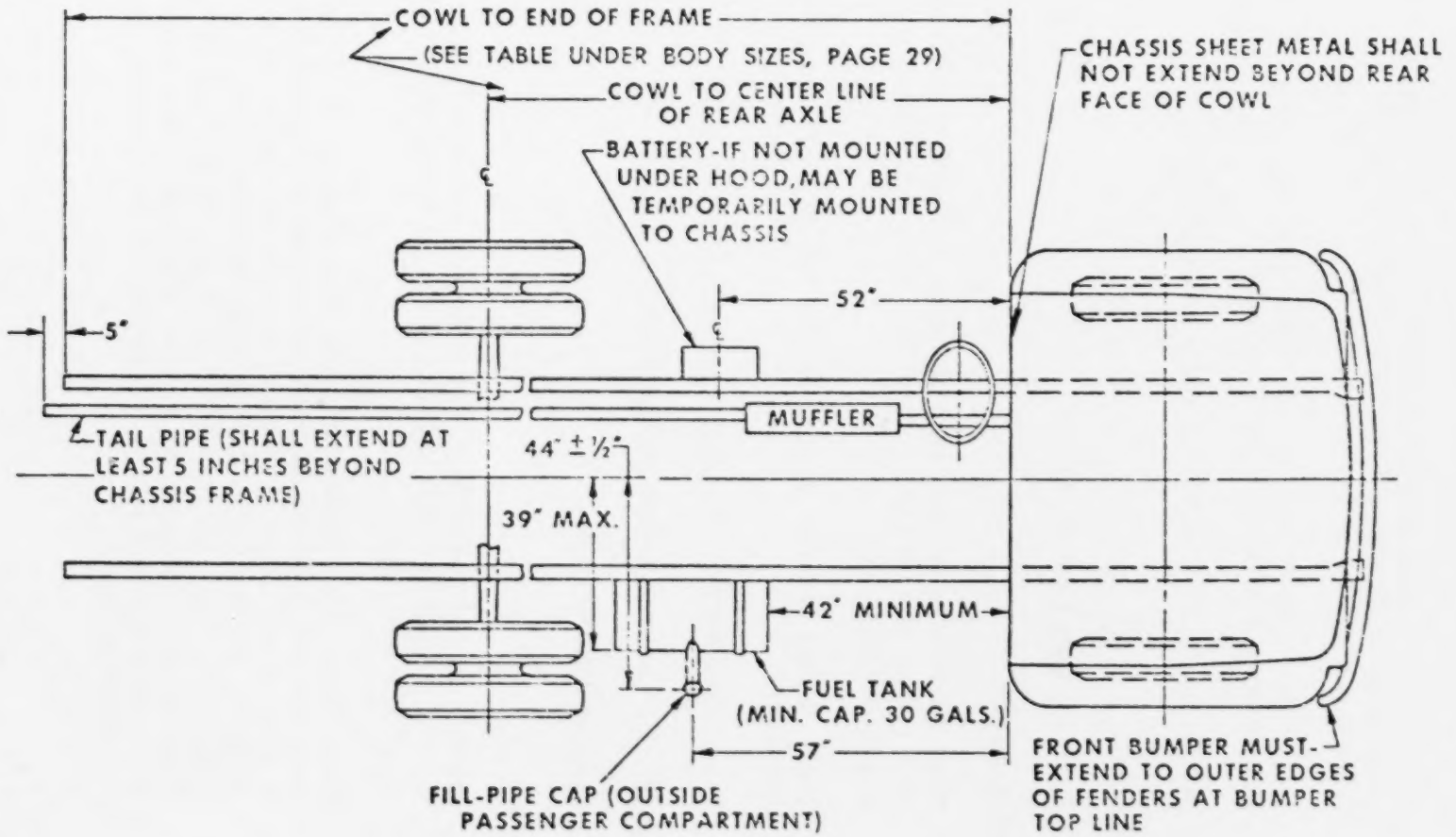
[6]Federal Standard No. 595a, black enamel No. 17038. Color chips are available from General Services Administration, Specifications Sales, Building 197, Washington Navy Yard, Washington, D. C. 20407.

[7]Federal Standard No. 595a, chrome yellow enamel No. 13432. Color chips are available from source given in footnote 6.

CHASSIS PLAN


COWL TO END OF FRAME
(SEE TABLE UNDER BODY SIZES, PAGE 29)
COWL TO CENTER LINE OF REAR AXLE
BATTERY-IF NOT MOUNTED UNDER HOOD, MAY BE TEMPORARILY MOUNTED TO CHASSIS
CHASSIS SHEET METAL SHALL NOT EXTEND BEYOND REAR FACE OF COWL
52"
5"
MUFFLER
TAIL PIPE (SHALL EXTEND AT LEAST 5 INCHES BEYOND CHASSIS FRAME)
44" ± ½"
39" MAX.
42" MINIMUM
FUEL TANK (MIN. CAP. 30 GALS.)
57"
FILL-PIPE CAP (OUTSIDE PASSENGER COMPARTMENT)
FRONT BUMPER MUST EXTEND TO OUTER EDGES OF FENDERS AT BUMPER TOP LINE

3. Size of tailpipe shall not be reduced after it leaves muffler.

4. Exhaust system shall be properly insulated from fuel tank and tank connections by securely attached metal shield at any point where it is 12 inches or less from tank or tank connections.

5. Noise level shall not exceed 125 sones as measured by Beranek-Armour-ATA Equivalent Tone Method.[8]

6. Muffler shall be constructed of corrosion-resistant material.

Exception

Item 2 does not apply for small vehicles.

Fenders, front –

1. Total spread of outer edges of front fenders, measured at fender line, shall exceed total spread of front tires when front wheels are in straight-ahead position.

2. Front fenders shall be properly braced and free from any body attachment.

3. Chassis sheet metal shall not extend beyond rear face of cowl.

Exception – transit, metropolitan, and small vehicles

Standard does not apply.

Frame –

1. Frame or equivalent shall be of such design as to correspond at least to standard practice for trucks of same general load characteristics which are used for severe service.

2. When frame side members are used they shall be of one-piece construction. If frame side members are extended, such extension shall be designed and furnished by chassis or body manufacturer with his guarantee, and installation shall be made by either chassis or body manufacturer and guaranteed by company making installation. Extensions of frame lengths are permissible only when such alterations are behind rear hanger of rear spring and shall not be for purpose of extending wheelbase.

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[8]Automobile Manufacturers Association, 320 New Center Building, Detroit Michigan 48202.

3. Holes in top or bottom flanges of frame side rail shall not be permitted except as provided in original chassis frame. There shall be no welding to frame side rails except by chassis or body manufacturer.

Frame lengths – To be furnished in accordance with table on Body sizes shown on page 30.

Fuel tank –

1. Fuel tank shall have minimum capacity of 30 gallons and be mounted directly on right side of chassis frame, filled and vented entirely outside body.

2. Tank shall conform to Section 393.65, subsections (f) through (g) and (j) of Motor Carrier Safety Regulations,[9]* with reference to: material and method of construction; fitting design(s) and locations; fill-pipe design, air and safety vents; pressure relief; and drop tests, rupture, spillage restrictions, and safety vent.

3. Fuel filter with replaceable element shall be installed between fuel tank and carburetor.

4. Fuel tank, fittings or lines, shall not extend above top of chassis frame rail.

5. If tank sizes other than 30 gallons are supplied, location of front of tank and filler spout must remain as specified below.

Note: Measurements shown below are for guidance of chassis manufacturers and serve only to prevent need for relocating the original tank. Inspectors concerned with state or local approval of vehicle need not consider them unless tank does not fit.

a. Tank shall not extend in height above side member of chassis.

b. Distance from center line of chassis to outside of tank shall not be more than 39 inches.

c. Bottom of tank shall not be more than 14 inches below top of frame or below outer body panel.

d. Distance from cowl to front of tank shall be 42 inches minimum.

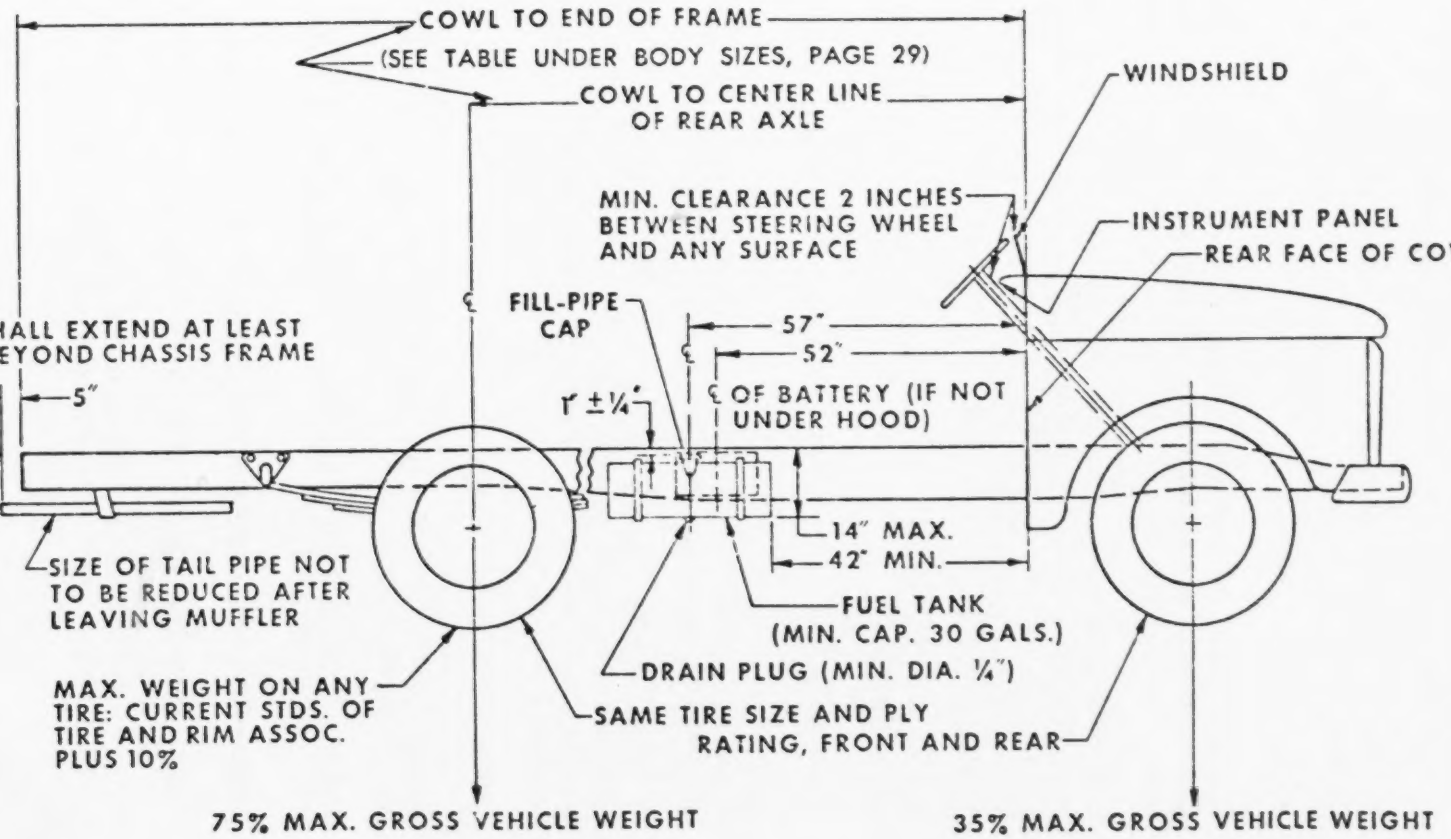
e. Distance from cowl to center of fill-pipe cap shall be 57 inches.

f. Distance from center line of chassis to center of fill-pipe cap shall be 44 inches with plus or minus tolerance of ½ inch permitted.

* Exception 1(2)

[9]Motor Carrier Safety Regulations (as amended through September 1969) issued by Bureau of Motor Carrier Safety, U. S. Department of Transportation, Washington, D. C. 20591.

CHASSIS ELEVATION


COWL TO END OF FRAME
(SEE TABLE UNDER BODY SIZES, PAGE 29)
COWL TO CENTER LINE OF REAR AXLE
WINDSHIELD
MIN. CLEARANCE 2 INCHES BETWEEN STEERING WHEEL AND ANY SURFACE
INSTRUMENT PANEL
REAR FACE OF COWL
FILL-PIPE CAP
TAIL PIPE SHALL EXTEND AT LEAST 5 INCHES BEYOND CHASSIS FRAME
5"
57"
52"
r ±¼"
℄ OF BATTERY (IF NOT UNDER HOOD)
14" MAX.
42" MIN.
FUEL TANK (MIN. CAP. 30 GALS.)
SIZE OF TAIL PIPE NOT TO BE REDUCED AFTER LEAVING MUFFLER
DRAIN PLUG (MIN. DIA. ¼")
MAX. WEIGHT ON ANY TIRE: CURRENT STDS. OF TIRE AND RIM ASSOC. PLUS 10%
SAME TIRE SIZE AND PLY RATING, FRONT AND REAR
75% MAX. GROSS VEHICLE WEIGHT
35% MAX. GROSS VEHICLE WEIGHT

g. Center of fill-pipe cap shall be 1 inch below top of frame with plus or minus tolerance of ¼ inch permitted.

Exceptions

1. For small vehicles, the fuel tank shall be manufacturer's standard, mounted, filled, and vented outside of body.

2. For small school bus of body-on-chassis type with manufacturer's rated seating capacity of 16 to 23 passengers inclusive, fuel tank may, due to space limitation, be mounted on left chassis rail and have capacity of less than 30 gallons.

3. On vehicles of less than 54-pupil capacity constructed for transporting handicapped children, fuel tank, meeting requirements of large vehicles, may be mounted on left chassis rail or behind rear wheels with fill pipe on right side of body.

4. On transit-type school buses, fuel tank shall be mounted on right frame rail, and measurements in notes d and e above should be from forward service door post.

Generator or alternator –

Generator or alternator with rectifier shall have maximum output of at least 62 amperes (in accordance with Soceity of Automotive Engineers rating) with minimum charging of 20 amperes at manufacturer's recommended engine idle speed (12-volt system), and shall be ventilated and voltage-controlled and, if necessary, current-controlled. Dual belt drive shall be used with generator or alternator.

Note: In colder climates, alternator output should be increased.

Exception – small vehicles

Generator or alternator with rectifier shall have maximum output of at least 50 amperes with 12-volt system, and shall be ventilated and voltage-controlled and, if necessary, current-controlled.

Suggested Method for Estimating
Generator or Alternator Capacity

Constant Load

Equipment	Numbers of Units	Current Draw (Amperes)
Ignition		2.50 (average)

Equipment	Numbers of Units	Current Draw (Amperes)
Head Lamps(Type 2 dual lower beam)	2	8.40
Tail lights	2	1.18
Clearance lights	4	2.36
Cluster lights	6	3.54
Body instrument panel		0.80
Primary front heater motors	2	24.00
Primary defroster motor	1	12.00
Supplementary front heater motor	1	12.00
Supplementary defroster motor	1	12.00
Underseat heater motors	2	10.50
Underseat heater motor	1	8.50
Defroster fan motor	1	3.50
Windshield wipers		14.00
Fuel pump		3.00
Intermittent Load		
Emergency door buzzer		1.00
Flasher motor		2.90
Alternately flashing signal lamps	2	11.60
Step-well and 6 interior dome lights		5.64
Individual additional dome lights		0.94
Stop (brake) lights	4	6.60
Turn signals	2	2.36

To determine the electrical load (in amperes) for a typical school bus, following formula is recommended:

Constant load + 35% of intermittent load = total load.

Governor –

Engine governor is permissible and where used shall be set at manufacturer's recommended maximum engine speed. When it is desired to limit road speed, road-speed governor should be installed.

Exception – transit and metropolitan vehicles

When engine is remotely located from driver, governor shall be installed to limit engine speed to maximum revolutions per minute recommended by engine manufacturer, or tachometer shall be installed so engine speed may be known to driver.

Heating system, provision for –

Chassis engine shall provide inlet and outlet holes in accessible locations for attachment of bus heating system water lines.

Also see Heaters, page 41.

Horn –

1. Bus shall be equipped with horn or horns of standard make, each horn capable of producing complex sound in band of audiofrequencies between approximately 250 and 2,000 cycles per seond and having total sound level of 110 decibels within these frequency limits when measured at point on axis of horn 3 feet from exit of horn.

2. Sound-level measurements shall be made with meter that complies with American National Standard S1.4-1961 or current revision thereof, as promulgated by American National Standards Institute.[10] Measurement shall be made with meter set to flat response (C weighting network).

3. Sound-level measurements shall be made with horn or horns installed on bus. There shall be no reflecting walls or obstacles other than ground and vehicle closer than 100 feet from horn during sound-level measurements.

4. If louder horn is desired, it shall be capable of producing sound level of 120 decibels under conditions specified above.

Instruments and instrument panel –

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[10]American National Standards Institute, 1430 Broadway, New York, New York 10018.

1. Chassis shall be equipped with following instruments and gauges (lights in lieu of gauges are not acceptable):

   a. Speedometer.

   b. Odometer which will give accrued mileage including tenths of miles.

   c. Ammeter with graduated charge and discharge, both ammeter and its wiring to be compatible with generating capacities and capable of handling continuous current draw of 100 amperes.

   d. Voltmeter with graduated scale.

   e. Oil-pressure gauge.

   f. Water-temperature gauge.

   g. Fuel gauge.

   h. Upper-beam headlamp indicator.

   i. Air-pressure or vacuum gauge, where air or vacuum brakes are used, and audible low-pressure indicator to warn driver if air pressure in air-brake system falls below 60 pounds per square inch. See Brakes, page 12.

2. All instruments shall be easily accessible for maintenance and repair.

3. Above instruments and gauges shall be mounted on instrument panel in such manner that each is clearly visible to driver in normal seated position.

4. Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges.

Exceptions

On all small vehicles, both the ammeter and its wiring are to be compatible with generating capacity; also, items d and i above do not apply.

Oil filter –

Oil filter of replaceable element or cartridge type shall be provided and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design. Oil filter shall have oil capacity of at least 1 quart.

Openings –

All openings in floorboard or firewall between chassis and passenger-carrying compartment, such as for gearshift lever and auxiliary brake lever, shall be sealed unless altered by body manufacturer. (See Item 9 under Construction, page 35.)

Passenger load –

1. Average actual GVW (gross vehicle weight) is sum of average chassis weight, plus average body weight, plus 150 pounds for driver's weight, plus total seated pupil weight (based on 120 pounds per pupil).

2. Recommended chassis manufacturer's rated GVW (gross vehicle weight) is weight assigned to complete vehicle. (Weights assigned for each pupil capacity classification are shown in table for next topic, Power and gradeability.)

3. Manufacturer's gross vehicle weight rating shall be furnished in duplicate (unless more are requested by state department of education) by manufacturer to each state department of education. State department of education shall, in turn, transmit such rating to each other state agency responsible for development or enforcement of state standards for school buses.

Power and gradeability – (see Appendix for formula)

1. Chassis must be so geared and powered as to be capable of surmounting 3.7 percent grade at speed of 20 miles per hour with full load (see Passenger load, page 25 on continuous pull in direct drive.

2. Following figures are based on achieving 3.7 percent grade at 20 mph in direct drive using 1.5 rolling resistance (1.2 for buses having seating capacity of 68 or more pupils), 150-pound driver, 120-pound pupil, and 7.17:1 to 7.2:1 rear axle ratio.[11] For 36-pupil capacity, rear axle ratio is 6.16:1 or higher.

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[11] Best performance level will be obtained with slowest available axle ratio (for instance, 7.17:1 or 7.2:1). If conditions permit higher-geared top road speed, changing to faster axle ratio (for instance, 6.2:1) will reduce engine r.p.m. and therefore reduce available h.p. at any given road speed. Result will be reduced level of performance.

Chassis size/capacity	36	42	48	54	60	66	73
1. Recommended manufacturer's rated GVW	15,000	17,000	17,000	19,000	21,000	22,000	27,000**
a) Calculated avg. GVW (120 lbs. per pupil)	13,800	15,800	16,700	18,000	20,100	21,600	26,500**
b) Min. net HP required	42.6	48.6	51.5	55.4	61.9	66.5	76.9
@ 20 mph at eng. RPM	1368	1368	1325	1325	1267	1267	1206
2. a) Est. part of GVW front axle*	3,698	5,056	4,625	4,860	5,680	5,724	8,650
b) % Est. wt., front axle	26.8	32	27.7	27	26.3	26.5	32.6
c) Est. part of GVW rear axle*	10,102	10,744	12,074	13,140	14,420	15,836	17,850
d) % Est. wt., rear axle	73.2	68	72.3	73	73.7	73.7	67.4
3. Recommended tire size (w/tube)	7.50-20	7.50-20	8.25-20	8.25-20	9.00-20	9.00-20	10.00-20**
Ply rating	8 or 10	8 or 10	10	10	10	10	12
a) Rim size (w/tube) Preferred	6.0	6.0	6.5	6.5	7.0	7.0	7.5
Alternate			6.0	6.0	6.5	6.5	7.0
4. Motor speed (RPM) necessary to attain road speed of 55 mph with	7.2-1 3738	7.2-1 3738	7.2-1 3564	7.2-1 3564	7.2-1 3412	7.2-1 3412	7.2-1 3294
gear ratio shown	6.8-1 3522	6.8-1 3522	6.8-1 3516	6.8-1 3516	6.8-1 3223	6.8-1 3223	6.8-1 3110

School bus operators should follow current recommended tire inflation tables of Tire & Rim Association.

*Approximate weights on axles are calculated by formula which does not provide for reserve capacity.

**The calculations in this column are for the 73-pupil capacity pusher school bus, but are not intended to limit the use of a forward control transit school bus.

Shock absorbers –

Bus shall be equipped with front and rear double-acting shock absorbers compatible with manufacturer's rated axle capacity.

Springs –

1. Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain loaded bus without evidence of overload.

2. Springs or suspension assemblies shall be designed to carry their proportional share of gross vehicle weight in accordance with requirement for Weight distribution as shown on page 28.

3. If rear springs are used, they shall be of progressive type.

4. If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

Exception – small vehicles

Springs that are regular equipment on vehicle to be purchased may be used.

Steering gear –

1. Steering gear shall be approved by chassis manufacturer and designed to assure safe and accurate performance when vehicle is operated with maximum load and at maximum speed.

2. Steering mechanism shall provide for easy adjustment for lost motion.

3. No changes shall be made in steering apparatus which are not approved by chassis manufacturer.

4. There shall be clearance of at least 2 inches between steering wheel and cowl instrument panel, windshield, or any other surface.

5. Power steering is permissible if approved by chassis manufacturer.

Tires and rims –

1. Tire sizes shall be shown in table on Page 26.

27

2. Rim sizes shall be based upon current standards of Tire and Rim Association.[12]

3. Total weight imposed on any tire shall not be greater than the current standard of Tire and Rim Association.[12]

4. Dual rear tires or wide single equivalents shall be provided on all vehicles.

5. All tires on given vehicle shall be of same size and ply rating except where wide single equivalents are used.

6. Spare tire, if required, shall be suitably mounted in accessible location outside passenger compartment.

Exception – small vehicles

Same as above, except that dual rear tires are not required and spare tire rack may be inside passenger compartment.

Transmission –

1. Mechanical type transmission shall be synchromesh except first and reverse gears. Its design shall provide not less than four forward and one reverse speeds.

2. Automatic transmissions are permissible but shall be specified only where chassis is equipped with a parking brake which will secure vehicle under all conditions.

Exception – small vehicles

Three-speed transmissions are acceptable.

Undercoating –

Chassis manufacturer shall coat undersides of front fenders with compound to prevent rust which meets or exceeds federal specification TT-C-520a using modified test procedures as outlined on page 55 of body standards.

Weight distribution –

Weight distribution of fully loaded bus on level surface shall be such that not more than 75 percent of gross vehicle weight is on rear tires and not more than 35 percent is on front tires.

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[12]Current standards may be obtained from Tire and Rim Association, Comand Building, 34 North Hawkins Avenue, Akron, Ohio 44313, or from tire manufacturers.

Exception – transit, metropolitan, and small vehicles

With engine inside front of body: If entrance door is ahead of front wheels, not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 50 percent on front tires. If entrance door is behind front wheels, not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 40 percent on front tires. With engine in rear: Not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 40 percent on front tires.

29

Aisle –

1. Minimum clearance of all aisles, including aisle (or passageway between seats) leading to emergency door, shall be 12 inches. (See Item 2 f under Doors, page 36.)

2. Aisle supports of seat backs shall be slanted away from aisle sufficiently to give aisle clearance of 15 inches at tops of seat backs.

Exception – transit and metropolitan vehicles

With engine inside front of body: Minimum distance between stanchion at rear of entrance step-well and engine cover shall be 14 inches measured at floor level.

Battery –

1. Battery is to be furnished by chassis manufacturer.

2. When battery is mounted outside of engine compartment by chassis manufacturer, body manufacturer shall securely attach battery on slide-out tray in closed, vented compartment in body skirt whereby battery may be exposed to outside for convenient servicing. Battery compartment door or cover shall be secured by adequate and conveniently operated latch or other type fastener. (See also page 11.)

Body sizes –

Bodies for conventional body-on-chassis type vehicles shall be limited to lengths shown in table below. Sizes are based on 27-inch center-to-center spacing between rows of forward-facing seats, over-all width of 96 inches, center aisle width of 12 inches, and average rump width of (a) 13 inches for 3-3 seating plan and (b) 15 inches for 3-2 seating plan. Body lengths are measured from back of cowl to rear of body at floor level.

Number of rows of seats	Pupil Capacity 3-3 plan; rump width of 13 inches	3-3 plan; rump width of 15 inches	Maximum body length (in inches)	Minimum measurement, cowl to center line of rear axle (in inches)	Minimum measurement, cowl to end of frame* (in inches)
4	24	20	178	102	173
5	30	25	196	123	187
6	36	30	222	125	210
7	42	35	250	142	241
8	~~48~~	40	277	160	268
9	54	45	304	192	295
10	60	50	332	211	323
11	66	55	355	229	349

*This column refers to frame lengths as produced by chassis mfr. and may be altered, plus or minus, by body mfr.

Exceptions – Measurements in preceding table do not apply to transit and metropolitan vehicles nor to vehicles of less than 24-pupil capacity.

Bumper, front – see page 15.

Bumper, rear –

1. Rear bumper shall be of pressed steel channel at least 3/16-inch thick and 8 inches wide (high).

2. It shall be wrapped around back corners of bus. It shall extend forward at least 12 inches, measured from rear-most point of body at floor line.

3. Bumper shall be attached to chassis frame in such manner that it may be easily removed, shall be so braced as to develop full strength of bumper section from rear or side impact, and shall be so attached as to prevent hitching of rides.

4. Rear bumper shall extend beyond rear-most part of body surface at least 1 inch, measured at floor line.

Exception – small vehicles

Standard does not apply.

Ceiling – see Insulation, page 43 and Interior, page 43.

Chains – see Item 4 under Wheel housings, page 55.

Color –

1. School bus body including hood, cowl, and fenders shall be painted uniform color, national school bus chrome,[13] according to specifications available from General Services Administration. (See Appendix.)

2. Rear bumper and lettering shall be black.[14]

3. Body trim, if used, shall be black.[14]

Construction –

1. Construction shall be of prime commercial quality steel or other metal or other material with strength at least equivalent to all-steel as certified by bus body manufacturer. All such construction materials shall be fire-resistant.

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[13]See footnote 7, Page 16.
[14]See footnote 6, Page 16.

2. Construction shall provide reasonably dustproof and watertight unit.

3. Bus body (including roof bows, body posts, strainers, stringers, floor, inner linings, outer panels, rub rails, and other reinforcements) shall be of sufficient strength to support entire weight of fully loaded vehicle on its top or side if overturned. Bus body, as unit, shall be designed and built to provide impact and penetration resistance.

   As evidence that bus body meets this standard, all body manufacturers shall furnish, for each current body model, certification in duplicate (unless more are requested by state department of education) that bus body meets Static Load Test Code for School Bus Body Structure[15] Copies of Code will be furnished by School Bus Manufacturers Institute to each state department of education. State department of education will in turn transmit copies of Code and individual model certificates to individual state agencies responsible for development and/or enforcement of state standards for school buses.

   Details involved in testing body structure will remain as shown in Code; to qualify under Code, however, deflections of body structure must not exceed following measurements:

   a. deflection at center of roof bow .....3.00 inches

   b. deflection of each side pillar at window sill level ..... 1.00 inch

   c. deflection at center of floor .....40 inch

4. Floor shall be of prime commercial quality steel of at least 14-gauge or other metal or other material at least equal in strength to 14-gauge steel. If plywood is used, it shall be 5-ply, at least 5/8-inch thick and it shall be equal or exceed properties of exterior-type softwood plywood, B-B Grade, as specified in standard issued by U. S. Department of Commerce.[16] Floor shall be level from front to back and from side to side except in wheel housing, toeboard, and driver's seat platform areas.

5. Roof strainers: Two or more roof strainers or longitudinal members shall be provided to connect roof bows, to reinforce flattest portion of roof skin, and to space roof bows. These strainers may be installed between roof bows or applied externally. They shall extend from windshield header and, when combined with rear emergency door post, are to function as longitudinal members extending from windshield

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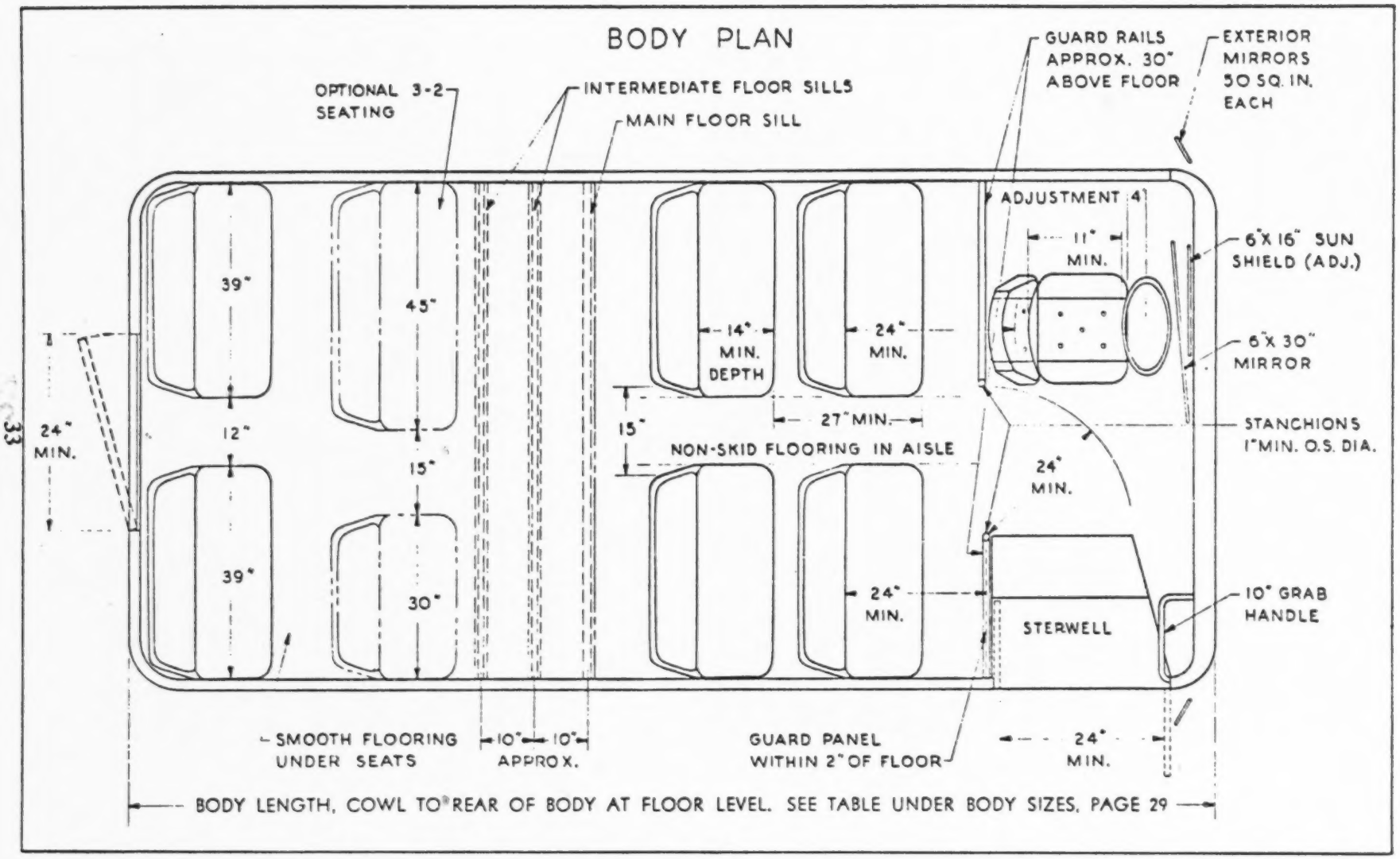
[15]Obtainable from School Bus Manufacturers Institute, an Industry Division of Truck and Body and Equipment Association, Inc., 5530 Wisconsin Avenue, N.W., Washington, D. C. 20015.

[16]Product Standard PS1-66, Softwood Plywood, Construction and Industrial (amended). Obtainable from Superintendent of Documents, Washington, D. C. 20401. Price, 20 cents.


BODY PLAN
OPTIONAL 3-2 SEATING
INTERMEDIATE FLOOR SILLS
MAIN FLOOR SILL
GUARD RAILS APPROX. 30" ABOVE FLOOR
EXTERIOR MIRRORS 50 SQ. IN. EACH
ADJUSTMENT 4"
11" MIN.
6"X 16" SUN SHIELD (ADJ.)
6"X 30" MIRROR
STANCHIONS 1"MIN. O.S. DIA.
39"
45"
14" MIN. DEPTH
24" MIN.
27" MIN.
15"
NON-SKID FLOORING IN AISLE
24" MIN.
12"
15"
39"
30"
24" MIN.
STERWELL
10" GRAB HANDLE
SMOOTH FLOORING UNDER SEATS
10"
10" APPROX.
GUARD PANEL WITHIN 2" OF FLOOR
24" MIN.
BODY LENGTH, COWL TO REAR OF BODY AT FLOOR LEVEL. SEE TABLE UNDER BODY SIZES, PAGE 29

header to rear floor body cross member. At all points of contact between strainers or longitudinal members and other structural material, attachment shall be made by means of welding, riveting, or bolting.

After load as called for in Static Load Test Code has been removed, none of following defects shall be evident:

a. Failure or separation at joints where strainers are fastened to roof bows.

b. Appreciable difference in deflection between adjacent strainers and roof bows.

c. Twisting, buckling, or deformation of strainer cross section.

6. Side strainer(s): There shall be one or more side strainers or longitudinal members to connect vertical structural members and to provide impact and penetration resistance in event of contact with other vehicles or objects. Such strainer(s) shall be formed (not in flat strip) from metal of at least 16-gauge and 3 inches wide.

   Side strainer(s) shall be installed in area between bottom of window and bottom of seat frame and shall extend completely around bus body except for door openings and body cowl panel. Side strainer(s) shall be fastened to each vertical structural member in any one or any combination of following methods as long as stress continuity of member(s) is maintained:

   a. Installed between vertical members.

   b. Installed behind panels but attached to vertical members.

   c. Installed outside external panels.

   Fastening method employed shall be such that strength of strainer(s) is fully utilized.

   Side strainer(s) or longitudinal member(s) may be combined with one of required rub rails (see page 48) or be in form of additional rub rail, as long as separate conditions and physical requirements for rub rails are met. No portion of side strainer or longitudinal member is to occupy same vertical position as either rub rail.

7. Rear corner reinforcements: Rear corner framing of bus body between floor and window sill and between emergency door posts and last side posts shall consist of at least three structural members applied horizontally or vertically or in another combination to provide additional impact and penetration resistance equal to that provided by frame members in areas of sides of body. Such structural members shall be securely attached at each end.

8. a. Floor sills: There shall be one main body sill at each side post and two intermediate body sills on approximately 10-inch centers. All sills shall be of equal height not to exceed 3 inches. All sills shall extend width of body floor except where structural members or features restrict area.

Main body sill shall be equivalent to or heavier than 10-gauge and each intermediate body sill shall be equivalent to or heavier than 16-gauge, or each of all body sills shall be equivalent to or greater than 14-gauge. All sills shall be permanently attached to floor.

b. Connections between sides and floor system shall be capable of distributing loads from vertical posts to all floor sills. As evidence that this requirement is fulfilled, none of following conditions shall occur during or after application of load as called for in Static Load Test Code:

(1) Appreciable difference in deflection between adjacent sills.

(2) Failure or separation in joints where floor, floor sills, and sides connect.

(3) Twisting, buckling, or deformation of floor sill cross sections.

9. All openings between chassis and passenger-carrying compartment made due to alternation by body manufacturer must be sealed. (See Openings, page 25.)

Exception – small vehicles

Items 1 through 9 do not apply.

Defrosters –

Each school bus shall have windshield defroster and defogging system which shall provide defogging of driver's windows and entrance door glass.

Doors –

1. Service door:

a. Service door shall be power or manually operated, under control of driver, and so designed as to afford easy release and prevent accidental opening. When hand lever is used, no parts shall come together so as to shear or crush fingers.

b. Service door shall be located on right side of bus opposite driver and within his direct view.

c. Service door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 68 inches.

d. Service door shall be of split type, sedan type, or jackknife type. (Split-type door includes any sectioned door which divides and opens inward or outward.) If one section of split-type door opens inward and other opens outward, front section shall open outward.

e. Lower as well as upper panels shall be of approved safety glass. (See Item 1 under Windshield and windows, page 56.) Bottom of lower glass panel shall not be more than 35 inches from ground when bus is unloaded. Top of upper glass panel shall not be more than 6 inches from top of door.

f. Vertical closing edges shall be equipped with flexible material to protect children's fingers.

g. There shall be no door to left of driver. (This shall not be interpreted to conflict with Items 2 a below.)

Emergency door and emergency window:

a. Emergency door shall be located in center of rear end of bus or in rear half of left side of bus if engine is so located as to make it impossible to place door in center of rear end.

b. Emergency door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 48 inches measured from floor level.

c. Emergency door shall be hinged on right side if in rear end of bus and on front side if on left side of bus. It shall open outward and shall be labeled inside to indicate how it operates.

d. Upper portion of emergency door shall be equipped with approved safety glass, exposed area of which shall be not less than 400 square inches. (See Item 1 under Windshield and windows, page 56.)

e. There shall be no steps leading to emergency door.

f. No seat or other object shall be so placed in bus as to restrict any part of passageway leading to either rear or left-side emergency door to opening smaller than rectangle of 12 inches in width and 48 inches in height, measured from floor level.

g. Words "EMERGENCY DOOR," both inside and outside in letters at least 2 inches high, shall be placed at top of or directly above emergency door.

h. If emergency door is located on left side of bus:

(1) Window at rear shall be designed as emergency exit and shall be no smaller than 16 inches in height and 54 inches in width on buses 80 inches or more in width; it shall be no smaller than 16 inches in height and 48 inches in width on buses less than 80 inches in width. Window shall be hinged from top and devised and operated to insure against accidental closing in emergency.

(2) Paneling is required to cover space between top of rear divan seat and inside surface of emergency window at rear.

i. Words "EMERGENCY EXIT," in letters at least 2 inches high, shall be placed directly above emergency window on inside and directly below it on outside.

j. (1) Emergency door and emergency window shall be designed to be opened from inside and outside of bus and shall be equipped with fastening device which may be quickly released but is designed to offer protection against accidental release. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of nondetachable device so designed as to prevent hitching-to, but to permit opening when necessary.

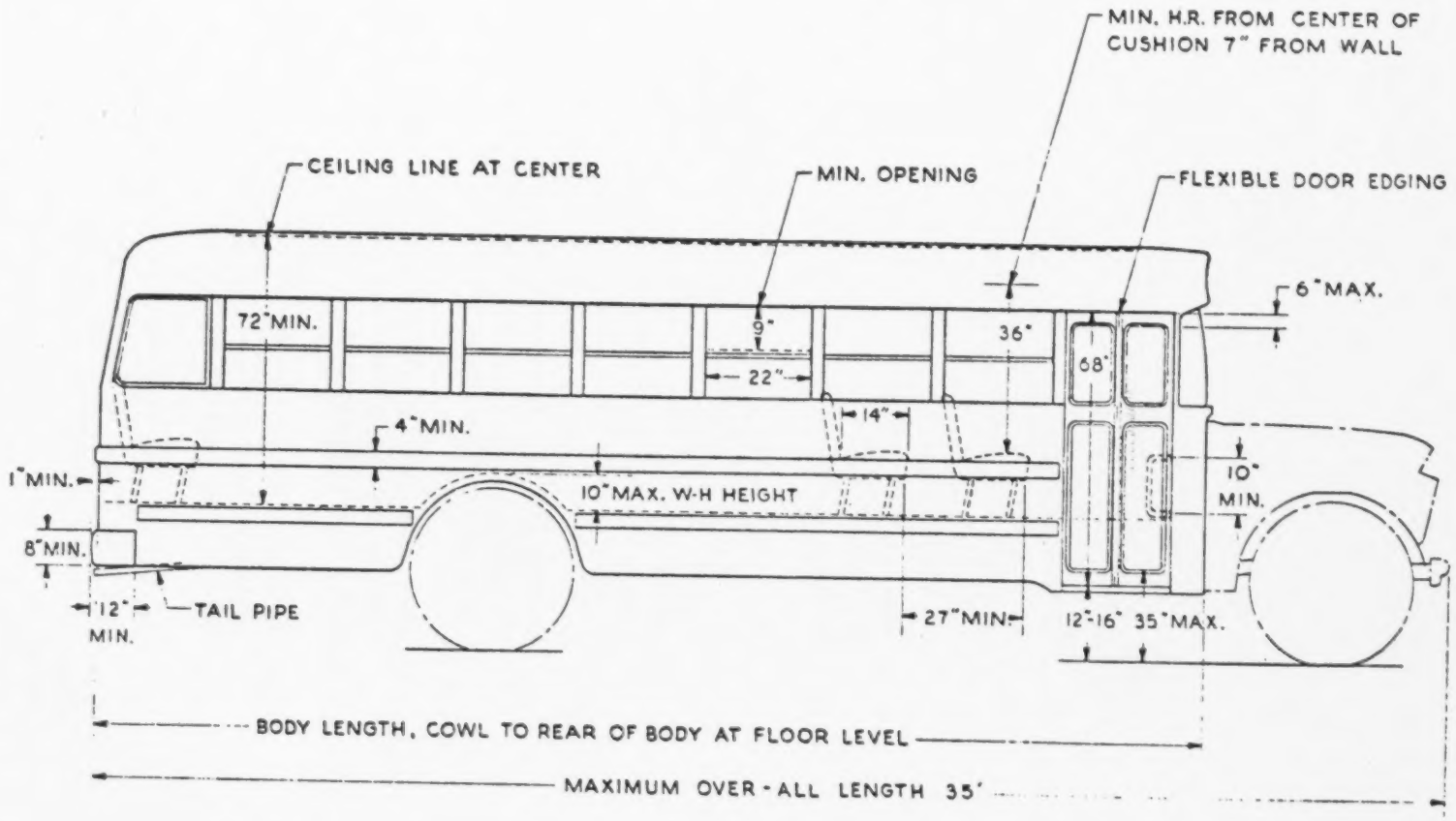
Emergency door shall be equipped with slide-bar, cam-operated lock. Slide bar shall have minimum stroke of 1 inch. Emergency door lock shall be equipped with suitable electric plunger-type switch connected with buzzer located in driver's compartment. Switch shall be enclosed in metal case, and wires leading from switch shall be concealed in bus body. Switch shall be so installed that plunger contacts farthest edge of slide bar in such manner that any movement of slide bar will immediately close circuit on switch and activate buzzer.

Door lock shall be equipped with interior handle that extends approximately to center of emergency door. It shall lift up to release lock.

(2) Emergency window in rear shall be equipped with latch (or latches) on inside, connected with electrical buzzer that will actuate when latch is being released.

It shall also be equipped on outside with nondetachable fastening device so designed as to prevent hitching-to, but to permit opening from the outside.

BODY ELEVATION



Exception – small vehicles. Substitute following standards for those above.

1. Service door shall be located to right of driver and shall be manually controlled from driver's seat by over-center control for bus-type conveyance.

2. Emergency door:

   a. Emergency door shall be located in center of rear end of bus and shall be equipped with fastening device for opening from inside and outside body, which may be quickly released but is designed to offer protection against accidental release. Metal guard shall be placed over door control on inside. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of device designed to prevent hitching-to, but to permit opening when necessary.

   b. Door shall open either vertically or horizontally. When vertical-type door is used, there shall be unobstructed egress at least 12 by 36 inches.

   c. Emergency door shall be marked "EMERGENCY DOOR" on inside.

   d. There shall be no steps leading to emergency door.

   e. No seat or other object shall be placed in bus which restricts passageway to emergency door to less than 12 inches.

Electrical system –

1. Battery – see pages 11, 30.

2. Generator or alternator – see page 21.

3. Lamps and signals – see page 45.

4. Wiring – see page 56.

5. See also Item 5 under Electrical System, page 16.

Emergency Window – see Item 2 under Doors, page 36.

Fire extinguisher –

1. Bus shall be equipped with at least one dry-chemical type fire extinguisher of at least 2½-pound capacity, mounted in extinguisher manufacturer's bracket of automotive type, and located in driver's compartment in full view of and readily accessible to driver.

2. Fire extinguisher shall bear label of Underwriters' Laboratories, Inc.,[17] showing rating of not less than 10-B:C.[18]

First-aid kit –

1. Bus shall carry removable metal first-aid kit container mounted in accessible place within driver's compartment. Compartment shall be marked to indicate its location.

2. Number of units and contents shall be designated by proper state authorities from following listed units:

   2 single units - 1 in. x 2½ yds. adhesive tape

   2 single units - sterile gauze pads 3 in. x 3 in. (12 per unit)

   1 single unit - ¾ in. x 3 in. adhesive bandages (100 per unit)

   2 single units - nonsterile triangular bandage approximately 40 in. x 36 in. x 54 in. with 2 safety pins

   3 single units - sterile gauze 36 in. x 36 in. (U.S.P. 2428 count)

   3 single units - sterile eye pads (1 per unit)

   1 pair scissors

Floor – see Construction on page 31.

1. Floor in underseat area, including tops of wheel housings, driver's compartment, and toeboard, shall be covered with fire-resistant rubber floor covering or equivalent having minimum over-all thickness of .125 inch.

2. Floor covering in aisle shall be of aisle-type fire-resistant rubber or equivalent, non-skid, wear-resistant, and ribbed. Minimum over-all thickness shall be .1875 inch measured from tops of ribs. Rubber floor covering shall meet Federal Specification ZZ-M-71d.[19]

3. Floor covering must be permanently bonded to floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of type recommended by manufacturer of floor-covering material. All seams must be sealed with waterproof sealer.

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[17] 207 East Ohio Street, Chicago, Illinois 60611.

[18] 10-B:C denotes amount of chemical needed to extinguish 10-square-foot type B fire (flammable liquid) or type C fire (electrical).

[19] Available from General Services Administration, Specification Sales, Building 197, Washington Navy Yard, Washington, D. C. 20407.

Exception – small vehicles - Floor covering on small vehicles.

Floor in underseat area, including tops of wheel housings, driver's compartment, and toeboard, shall be covered with fire-resistant rubber floor covering or equivalent having minimum over-all thickness which shall not be less than .125" over ribs of floor and not less than 5/16" between ribs of floor, meeting SAE Standard J-200.

Heaters –

1. Where heaters are required, they shall be of hot-water or combustion type.

2. If only one heater is used, it shall be of fresh-air or combination fresh-air and recirculating type.

3. If more than one heater is used, additional heaters shall be of recirculating air type.

4. Where hot-water heaters are used, they shall bear name plate rating in accordance with Standard Code for Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment,[20] plate to be affixed by heater manufacturer. Copies of the Code shall be furnished in duplicate (unless more are requested by state department of education) by School Bus Manufacturers Institute to each state department of education. State department of education shall, in turn, transmit such Code to each other state agency responsible for development or enforcement of state standards for school buses.

5. All combustion-type heaters shall be approved by Underwriters' Laboratories, Inc.[21]

6. If combustion-type heaters are used, they shall be installed on new buses by body manufacturers and on buses now in operation by authorized dealers or by authorized garages.[22]

7. Heaters shall be capable of maintaining inside temperature of 50 degrees Fahrenheit at average minimum January temperatures as established by U. S. Department of Commerce, Weather Bureau,[23] for area in which heater is required.

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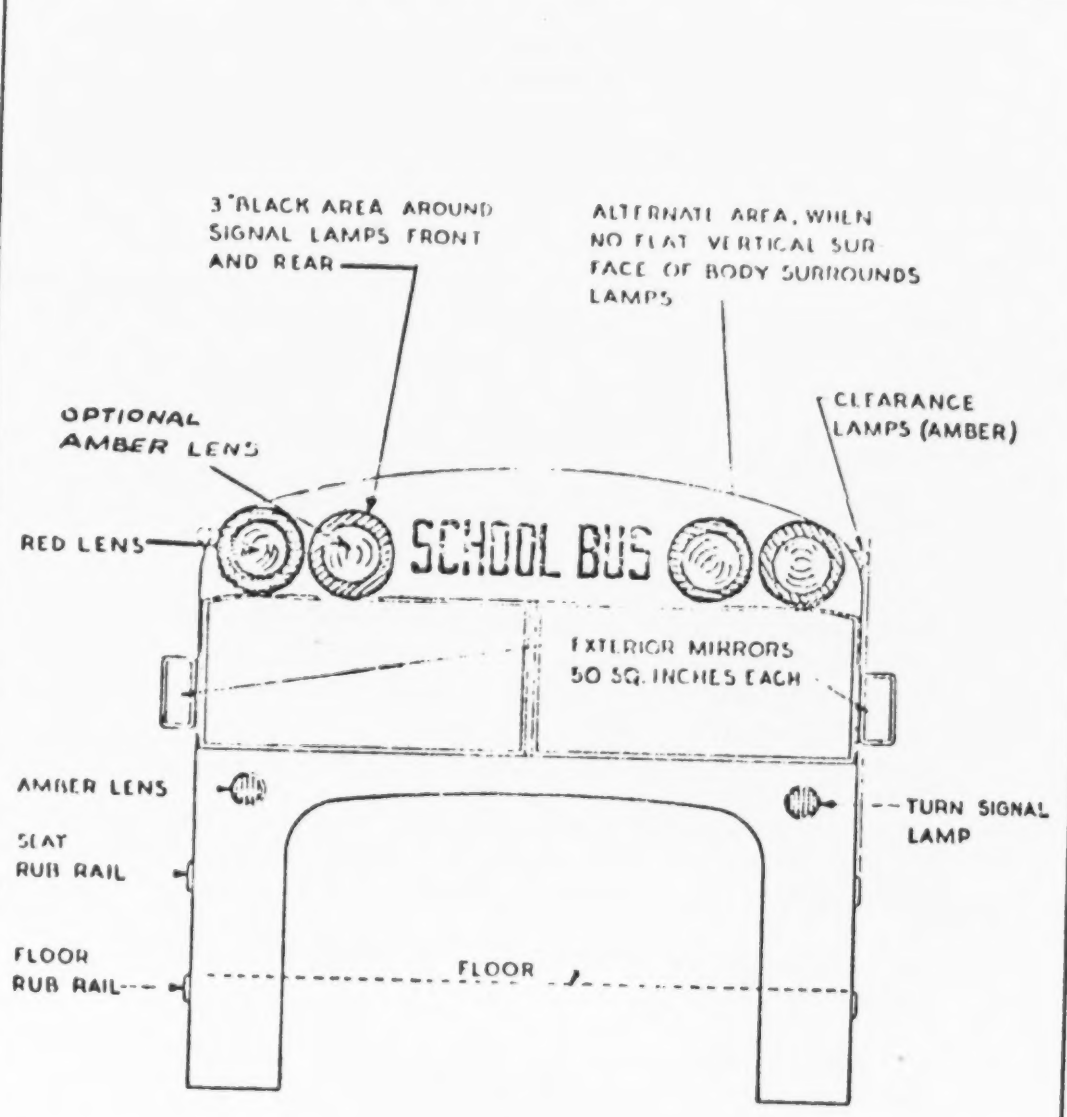
[20]Obtainable from School Bus Manufacturers Institute, an Industry Division of Truck Body and Equipment Association, Inc., 5530 Wisconsin Avenue, N.W., Washington, D. C. 20015.

[21]207 East Ohio Street, Chicago, Illinois 60611.

[22]See requirements for combustion-type heaters in current Motor Carrier Safety Regulations, issued by Bureau of Motor Carrier Safety, U. S. Department of Transportation, Washington, D. C. 20591.

[23]Washington, D. C. 20235.


3" BLACK AREA AROUND SIGNAL LAMPS FRONT AND REAR
ALTERNATE AREA, WHEN NO FLAT VERTICAL SURFACE OF BODY SURROUNDS LAMPS
CLEARANCE LAMPS (AMBER)
OPTIONAL AMBER LENS
RED LENS
SCHOOL BUS
EXTERIOR MIRRORS 50 SQ. INCHES EACH
AMBER LENS
TURN SIGNAL LAMP
SEAT RUB RAIL
FLOOR RUB RAIL
FLOOR

FRONT ELEVATION

Exception – small vehicles

Item 4 does not apply to vehicles not specifically manufactured as school buses.

Also see Heating system, provision for, page 23.

Identification –

1. Body shall bear words "SCHOOL BUS" in black letters at least 8 inches high on both front and rear of body or on signs attached thereto. Lettering shall be placed as high as possible without impairment of its visibility. Lettering shall conform to "Series B" of Standard Alphabets for Highway Signs.[24]

2. Words "STOP ON SIGNAL" may be painted on rear of bus. Word "STOP" by itself shall not be used. Height of letters may not exceed 5 inches.

3. Only signs and lettering approved by state law or regulation, limited to name of owner or operator and any number necessary for identification, shall appear on sides of bus.

Inside height –

Inside body height shall be nominal 72 inches or more, measured metal to metal, at any point on longitudinal center line from front vertical bow to rear vertical bow.

Exception – small vehicles

Standard does not apply.

Insulation –

Ceiling and walls shall be insulated with proper material to deaden sound and to reduce vibrations to a minimum. If thermal insulation is specified also, it shall be of fire-resistant material of type approved by Underwriters' Laboratories, Inc.[25]

Interior –

1. Interior of bus shall be free of all unnecessary projections likely to cause injury. This standard requires inner lining on ceilings and walls. If ceiling is constructed so as to contain lapped joints, forward panel shall be lapped by rear panel and exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.

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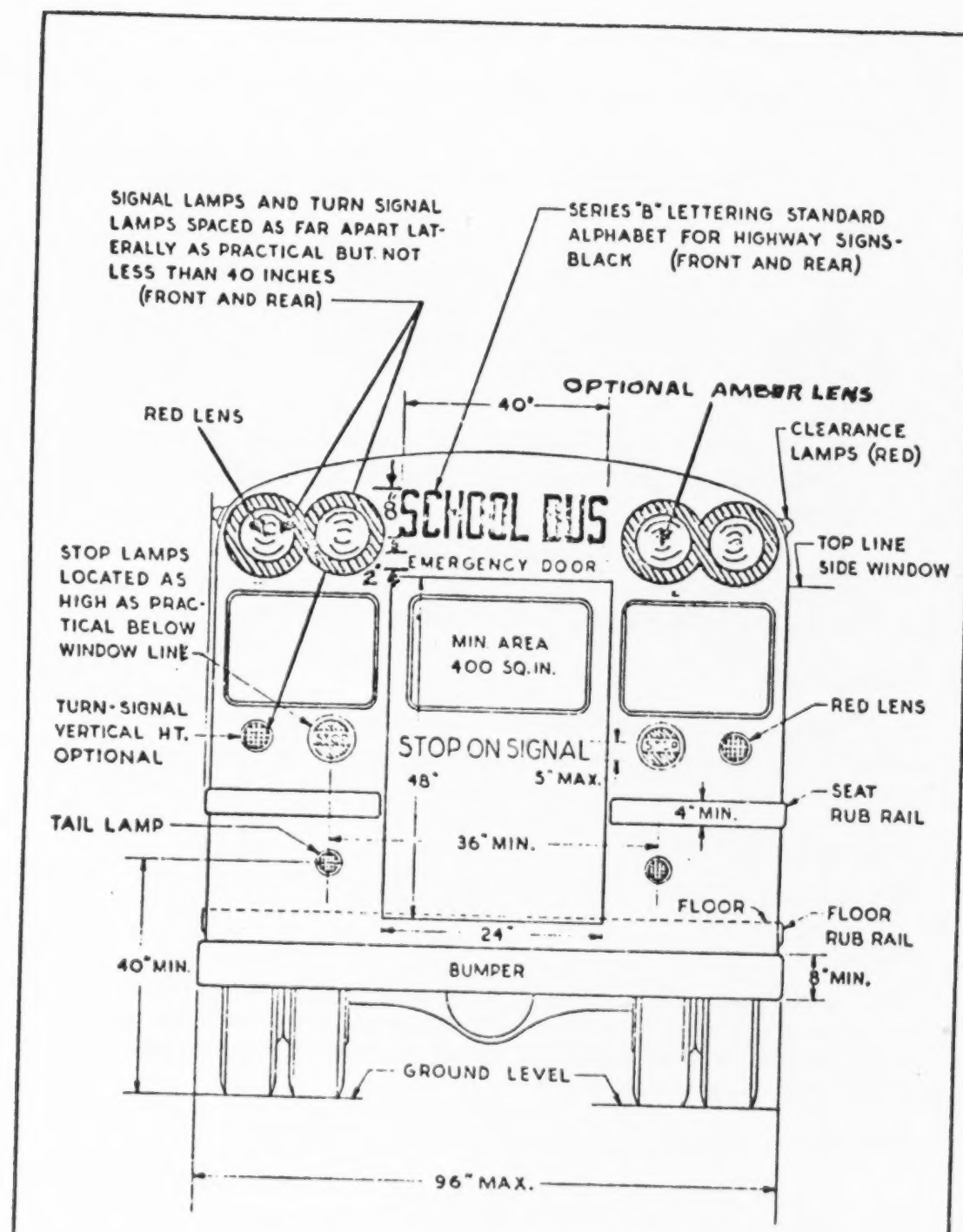
[24]Designed by U. S. Bureau of Public Roads for Joint Committee on Uniform Traffic Control Devices.

[25]207 East Ohio Street, Chicago, Illinois 60611.



REAR ELEVATION

44

2. Ceilings over aisles shall be free of all projections.

Lamps and signals –

1. All lamps on exterior of vehicle shall conform with and be installed as required by Federal Motor Vehicle Safety Standard 108.

2. Interior lamps: Interior lamps shall be provided which adequately illuminate aisle and step-well.

3. School bus alternately flashing red signal lamps:

   Definition: School bus alternately flashing red signal lamps are lamps mounted at same horizontal level, intended to identify vehicle as school bus and to inform other users of highway that such vehicle is stopped on roadway to take on or to discharge school children. Each state may choose either of following options.

   a. Bus shall be equipped with two red lamps at rear of vehicle and two red lamps at front of vehicle, which shall be controlled by manually actuated switch and when actuated shall flash alternately at rate of 60 to 120 cycles per minute. "On" period shall be long enough to permit bulb filament to come up to full brightness. No brake-operated switch shall be permitted.

   b. In addition to four red lamps described in (a) above, four amber lamps shall be installed as follows: one amber lamp shall be located near each red signal lamp, at same level, but closer to vertical centerline of bus; system of red and amber signal lamps shall be wired so that amber lamps are energized manually, and red lamps are automatically energized (with amber lamps being automatically de-energized) when bus entrance door is opened.

   c. Area around lens of each alternately flashing signal lamp and extending outward approximately 3 inches shall be painted black.[26] In installations where there is no flat vertical portion of body immediately surrounding entire lens of lamp, circular or square band of black[26] approximately 3 inches wide, immediately below and to both sides of lens, shall be painted on body or roof area against which signal lamp is seen (from distance of 500 feet along axis of vehicle).

4. Turn signal lamps: Bus shall be equipped with Class A turn signal lamps that meet specifications of Society of Automotive Engineers.[27] These signals must be independent units and must be equipped with four-way hazard warning switch to cause simultaneous flashing of turn signal lamps when needed as vehicular traffic hazard warning.

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[26]See footnote 6, page 16.

[27]485 Lexington Avenue, New York, New York 10017.

Turn signals. If additional turn signal lamps above those provided in Item 1 are required (front of body below windshield or side of body behind driver's compartment) they are to be connected to turn signal system without removal or disconnection of turn signal lamps supplied on chassis.

5. Warning devices for stopped disabled vehicles shall include one or more of the following options:[28]

   a. Three fuses and two red flags

   b. Three red electric lanterns and two red flags

   c. Three red emergency reflectors and two red flags.

Exception – small vehicles

1. Same as above except that clearance lamps are not required on small vehicles of less than 80 inches in overall width.

2. Step-well lamp is not required on small vehicles.

Metal treatment –

All metal used in construction of bus body shall be zinc- or aluminum-coated or treated by equivalent process before bus is constructed. (Included are such items as structural members, inside and outside panels, floor panels and floor sills; excluded are door handles, grab handles, stanchions, interior decorative parts, and other interior plated parts.)

All metal parts that will be painted shall be (in addition to above requirements) chemically cleaned, etched, zinc-phosphate-coated, and zinc-chromate or epoxy-primed or conditioned by equivalent process.

In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections of structural members, cut edges, punched or drilled hole areas in sheet metal, closed or box sections unvented or undrained areas, and surfaces subjected to abrasion during vehicle operation.

As evidence that above requirements have been met, samples of materials and sections used in construction of bus body, when subjected to 1,000-hour salt spray test as provided for in latest revision of ASTM Designation: B 117, "Standard Method of Salt Spray (Fog) Testing,"[29] shall not lose more than 10 percent of material by weight.

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[28] Motor Carrier Safety Regulations, par. 393.95, subpar. f., issued by Bureau of Motor Carrier Safety, U. S. Department of Transportation, Washington, D. C. 20591.

[29] American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Exception – small vehicles

Standard does not apply to small vehicles not specifically manufactured as school buses.

Mirrors –

1. Interior mirror shall be clear view safety glass at least 6 by 30 inches overall to afford good view of pupils and roadway to rear. Mirror shall be metal-backed and framed; it shall have rounded corners and protected edges.

2. Two exterior clear-view, rearview mirrors shall be provided, one to left and one to right of driver. Area of each mirror shall be not less than 50 square inches overall. Each mirror shall be firmly supported and adjustable to give driver clear views past left rear and right rear of bus.

3. Exterior convex mirror at least 7½ inches in diameter shall be located either on left or on right side of bus in such manner that seated driver may observe, through its use, areas to front or side of bus where direct observation is not possible. This same type mirror may be installed at other locations on bus to enable seated bus driver to observe areas alongside bus where direct observation is not possible.

Exception – small vehicles

Interior mirror shall be manufacturer's standard.

Mounting –

1. Chassis frame shall extend to rear edge of rear body cross member. Bus body shall be attached to chassis frame in such manner as to prevent shifting or separation of body from chassis under severe operating conditions.

2. Body front shall be attached and sealed to chassis cowl in such manner as to prevent entry of water, dust, and fumes through joint between chassis cowl and body.

3. Insulating material shall be placed at all contact points between body and chassis frame. Insulating material shall be approximately ¼-inch thick, shall have quality of sidewall of automobile tire, and shall be so attached to chassis frame or body member that it will not move under severe operating conditions.

Exception – small vehicles

Standard does not apply to vehicles not specifically manufactured as school buses.

Overall length –

Overall length of bus shall not exceed 40 feet.

Overall width –

Overall width of bus shall not exceed 96 inches.

Posts – see Construction, page 31.

Rub rails –

1. There shall be one rub rail located on each side of bus approximately at seat level which shall extend from rear side of entrance door completely around bus body (except for emergency door) to point of curvature near outside cowl on left side.

2. There shall be one rub rail located approximately at floor line which shall cover same longitudinal area as upper rub rail, except at wheel housings, and shall extend only to radii of right and left rear corners.

3. Both rub rails shall be attached at each body post and all other upright structural members.

4. Both rub rails shall be 4 inches or more in width, shall be of 16-gauge steel, and shall be constructed in corrugated or ribbed fashion.

5. Both rub rails shall be applied outside body or outside body posts. Pressed-in or snap-on rub rails do not satisfy this requirement.

Exception – small vehicles

Standard does not apply to small vehicles not manufactured specifically as school buses.

Sanders –

Where required or used, sanders shall:

1. Be of hopper cartridge-valve type.

2. Have metal hopper with all interior surfaces treated to prevent condensation of moisture.

3. Be of at least 100-pound (grit) capacity.

4. Have cover on filler opening of hopper, which screws into place, sealing unit airtight.

5. Have discharge tubes extending to front of each rear wheel under fender.

6. Have no-clogging discharge tubes with slush-proof, non-freezing rubber nozzles.

7. Be operated by electric switch with telltale light mounted on instrument panel.

8. Be exclusively driver-controlled.

9. Have gauge to indicate hoppers need refilling when they are down to one-quarter full.

Seat belt for driver –

Seat belt for driver shall be provided. Belt shall be equipped with retractor on each side of sufficient quality and strength to keep it retracted and off floor when not in use.

Seats –

1. All seats shall have minimum depth of 15 inches.

2. In determining seating capacity of bus, allowable average rump width shall be:

   a. 13 inches where 3-3 seating plan is used

   b. 15 inches where 3-2 seating plan is used.

   (see table under Body sizes, page 30.)

3. All seats shall be forward-facing and anchorage shall comply with Federal Motor Vehicle Safety Standard 207. (See Item 2 under Aisle, page 30.)

4. No bus shall be equipped with jump seats or portable seats.

5. Forward-most pupil seat on right side of bus shall be located so as not to interfere with driver's vision, not farther forward than guard rail behind driver or rear of driver's seat when adjusted to its rear-most position.

6. Minimum center-to-center seat spacing shall be 27 inches. Distance between driver's seat when adjusted to its rear-most position and front face of seat-back of forward-most pupil seat on left side of bus shall not be less than 24 inches measured at cushion height.

7. Seat and back cushions of all seats shall be designed to safely support designated number of passengers under normal road conditions encountered in school bus service. Coverings of seat cushions shall be of material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill.

8. All exposed tops and side rails of school bus passenger seats, including fiber-glass and plastic type, shall be padded extending to seat cushion level with an energy absorption material sufficient to minimize injury producing impact forces. The side rails shall be padded in such a manner to retain the 12 inch aisle. Back cushions shall be constructed so as to eliminate exposed screws or bolts, which contribute to vandalism of seats and their components.

9. Minimum distance between steering wheel and back rest of driver's seat shall be 11 inches. Driver's seat shall be strongly attached, shall have vertical adjustment, and shall have fore-and-aft adjustment of not less than 4 inches. Driver's seat anchorage shall comply with acceptable installation procedures.

10. Minimum of 36-inch headroom for sitting position above top of undepressed cushion line of all seats shall be provided. Measurement shall be made vertically not more than 7 inches from side wall at cushion height and fore-and-aft center of cushion.

11. Backs of all seats of similar size shall be of same width at top and of same height from floor and shall slant at same angle with floor.

12. Where grab handles on seats are used, they shall be enclosed.

13. Passenger seat cushion retention system shall be employed to prevent passenger seat cushions from disengaging from seat frames in event of accident. Each seat cushion retention system shall be capable of withstanding vertical static load equal to minimum of 5 times weight of cushion. System shall also be capable of withstanding forward or rearward static load equal to 20 times weight of cushion.

14. Fiber-glass seats may be used provided they meet following standards:

    a. Fiber-glass seats must meet all foregoing provisions for seats except those concerning construction of seat cushions and seat backs.

    b. Fiber-glass seats shall combine rigid construction of welded tubular steel with contoured matched die-formed or hand-sprayed molded plastic shell. Exposed steel shall be stainless steel or shall be finished with baked enamel.

c. Plastic shells shall consist of good commercial grade, fire-resistant, color-pigmented resin reinforced with glass fibers in such manner as to avoid resin-rich sections. Shells shall be shaped to provide maximum comfort.

d. Both metal frames and plastic shells shall have rounded corners and be free of sharp edges.

15. Plastic type seats made of acrylonitrile-butadiene-styrene (known as ABS seats) may be used provided they meet following standards:

a. Seats must meet all foregoing provisions for seats except those concerning construction of seat cushions and seat backs or those concerning seat backs only.

b. Seats shall combine rigid construction of welded tubular steel with thermoformed or injection-molded plastic shell. Exposed steel shall be stainless or shall be finished with baked enamel.

c. Plastic shells shall consist of good commercial grade, self-extinguishing, color-pigmented resin. Shells shall be shaped to provide maximum comfort.

d. Both metal frames and plastic shells shall have rounded corners and be free of sharp edges.

Exception – small vehicles

Substitute following standards for those above:

1. All seats shall be securely fastened to body of vehicle.

2. Seats shall be covered with fire-resistant padding material and comfortably upholstered with adequate padding. (Not applicable to fiber-glass seats.)

3. Jump seats or portable seats shall not be used.

4. Seat beside driver, if regular equipment or installed by vehicle manufacturer, may be used for pupil seating. It shall be securely fastened to body and shall be so constructed as not to interfere with pupils entering or leaving vehicle.

5. Allowable average rump width in determining seating capacity of bus shall be 13 inches.

6. All seats shall be at least 14 inches in overall depth.

7. If forward-facing seats are used, they shall be so placed that distance from center to center measured at top center of backs shall be not less than 27 inches.

8. If longitudinal seats are used, only two shall be installed and distance between front edges of seat cushions shall be at least 20 inches.

9. Back rest for each longitudinal seat shall measure at least 8 inches vertically and shall be so mounted that its top edge is at least 12 inches above seat.

Stanchions and guard rails –

1. Vertical stanchion shall be installed at right rear corner of driver's seat in such position as neither to interfere with adjustment of driver's seat nor to obstruct 12-inch aisle. Guard rail shall be so placed as not to interfere with fore-and-aft adjustment of driver's seat, shall not be higher than driver's seat back adjusted to its lowest position, and shall extend from vertical stanchion to left-hand wall behind driver's seat.

2. Vertical stanchion shall be installed at rear of entrance step-well from roof to floor. Placement shall not restrict passageway at any level to less than 24 inches nor aisle to less than 12 inches.

3. Guard rail and step-well guard panel shall be installed from step-well stanchion to right-hand wall to prevent children in front seat from being thrown into step-well in case of sudden stop. Guard rail shall be approximately 30 inches above floor and its guard panel shall not restrict entrance passageway to less than 24 inches at any level. Panel shall extend from guard rail to within 2 inches of floor. If panel extends over or into step-well opening, it must be flanged at floor line so as to close any opening between panel and floor.

4. Clearance between step-well guard panel and first pupil seat shall be at least 24 inches measured from panel to front face of seat back at cushion height.

5. All stanchions and guard rails shall be of steel or equivalent strength tubing having minimum outside diameter of 1 inch. Stanchions and guard rails shall be padded with an energy-absorbing material designed to minimize injury-producing impact forces. Padding on stanchions shall extend to within 3 inches of bus ceiling and to within 3 inches of bus floor. Padding on each guard rail shall extend from bus wall to its farthest support.

Exception – small vehicles

Standard does not apply to vehicles not specifically manufactured as school buses.

Steering wheel – see Item 4 under Steering gear on page 27.

Steps –

1. First step at service door shall be not less than 12 inches and not more than 16 inches from ground, based on standard chassis specifications.

2. Service door entrance may be equipped with two-step or three-step step-well. Risers in each case shall be approximately equal. When plywood floor is used on steel, differential may be increased by thickness of plywood used.

3. Steps shall be enclosed to prevent accumulation of ice and snow.

4. Steps shall not protrude beyond side body line.

5. Grab handle not less than 10 inches in length shall be provided in unobstructed location inside doorway.

Exception – small vehicles

Steps (if any) on small vehicles not manufactured specifically as school buses shall be manufacturer's standard.

Step treads –

1. All steps, including floorline platform area, shall be covered with 3/16-inch rubber metal-backed treads with at least 1½-inch white nosing (or 3-inch white rubber step edge with metal back at floorline platform area).

    a. Step tread minimum overall thickness shall be 3/16-inch ribbed design, similar to ribbed design of the rubber aisle;

    b. Metal back of tread, minimum 24-gauge cold roll steel, shall be permanently bonded to ribbed rubber; grooved design shall be such that said grooves run at 90-degree angle to long dimension of step tread;

    c. 3/16-inch ribbed step tread shall have a 1½-inch white nosing as integral piece without any joint;

    d. Rubber portion of step treads shall have following characteristics:

        (1) Special compounding for good abrasion resistance and high coefficient of friction

        (2) Flexibility so that it can be bent around a ½-inch mandrel both at 130 degrees F and 20 degrees F without breaking, cracking, or crazing

(3) Show a durometer hardness 85 to 95.

Exception – small vehicles

Stirrup steps –

There shall be one stirrup step and suitably located handle on each side of front of body for easy accessibility for cleaning windshield and lamps.

Exception – small vehicles

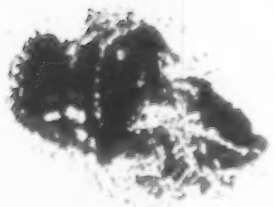
Standard does not apply to vehicles not specifically manufactured as school buses.

Exception – transit and metropolitan vehicles

A step, in lieu of the stirrup steps, is permitted in or on the front bumper.

Stop signal arm –

Stop signal arm may be installed on left side of bus. If stop signal arm is used, it shall contain alternating flashing red lamps which show both to the front and to the rear. These flashing lamps shall be connected to alternately flashing signal lamp circuit. Manual, vacuum, or air operation of stop signal arm is optional.



Storage compartment –

Metal container of adequate strength and capacity for storage of tire chains and/or tow chains and such tools as may be necessary for minor emergency repairs while bus in enroute shall be provided. Such storage container may be located either inside or outside passenger compartment but, if inside, it shall have cover (seat cushion may not serve for this purpose) capable of being securely latched and be fastened to floor in right rear or right front of bus.

Sun shield –

Interior adjustable transparent sun shield not less than 6 by 30 inches shall be installed in position convenient for use by driver.

Exception – small vehicles

Sun shield shall be manufacturer's standard.

Tailpipe –

Tailpipe shall not extend beyond rear bumper. (See Item 2 under Exhaust system, page 16.)

Undercoating –

Entire underside of bus body, including floor sections, cross members, and below floor line side panels, shall be coated with rust-proofing compound for which compound manufacturer has issued notarized certification of compliance to bus body builder that compound meets or exceeds all performance requirements of Federal Specification TT-C-520a[30] using modified test procedures* for following requirements:

1. Salt spray resistance - pass test modified to 5% salt and 1,000 hours

2. Abrasion resistance - pass

3. Fire resistance - pass

*Test panels are to be prepared in accordance with paragraph 4.6.12 of TT-C-520a[30] with modified procedure requiring that tests be made on a 48-hour air cured film at thickness recommended by compound manufacturer.

Undercoating compound shall be applied with suitable airless or conventional spray equipment to recommended film thickness and shall show no evidence of voids in cured film. Undercoating is expected to prevent rust under all bus service conditions for minimum of five years.

Ventilation –

1. Body shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.

2. Static-type non-closable exhaust ventilator shall be installed in low-pressure area of roof.

Exception – small vehicles

Wheel housings –

1. Wheel house openings shall allow for easy tire removal and service.

2. Wheel housings shall be designed to support seat and passenger loads and shall be attached to floor sheets in such manner as to prevent any dust or water from entering the body.

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[30]Federal Specification TT-C-520a, titled: Coating Compound, Bituminous, and Solvent Type, Underbody, (for Motor Vehicles). Available from General Services Administration, Specification Sales, Bldg. 197, Washington Navy Yard, Washington, D. C. 20407.

3. Inside height of wheel housings above floor line shall not exceed 10 inches.

4. Wheel housings shall provide clearance for chains on dual wheels as established by National Association of Chain Manufacturers.[31]

Exception – small vehicles

Standard does not apply to small vehicles not manufactured specifically as school buses.

Windshield and windows –

1. All glass in windshield, windows, and doors shall be of approved safety glass,[32] so mounted that permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction.

2. Glass in windshield may be heat-absorbing and may contain a shaded band across top. Location of "fade out" shall be above upper limit for minimum visibility.

3. Glass in all side windows, doors, and rear windows shall be AS-2 or better grade, as specified in Z26.1-1966.[32]

4. Each full side window shall provide unobstructed emergency opening at least 9 inches high and 22 inches wide, obtained by lowering of window.

5. Knockout-type, split-sash windows may be used.

Exception – small vehicles

Lowering of all side windows.

Windshield washers –

Windshield washers shall be furnished.

Windshield wipers –

Bus shall be equipped with two variable-speed windshield wipers of air or electric type powered by two motors of sufficient power to operate wipers.

Wiring –

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[31] 111 West Washington Street, Chicago, Illinois 60602.

[32] Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways (Z26.1-1966) obtainable from American National Standards Institute, 1430 Broadway, New York, New York 10018.

1. All wiring shall conform to current standards of Society of Automotive Engineers.[33]

2. Circuits:

   a. Wiring shall be arranged in at least eight regular circuits, as follows:

      (1) head, tail, stop (brake), and instrument panel lamps

      (2) clearance and step-well lamps
      (Step-well lamp shall be actuated when service door is opened)

      (3) dome lamp

      (4) starter motor

      (5) ignition and emergency door signal

      (6) turn signal lamps

      (7) alternately flashing signal lamps

      (8) horn

   b. Any of above combination circuits may be subdivided into additional independent circuits.

   c. Whenever heaters and defrosters are used, at least one additional circuit shall be installed.

   d. Whenever possible, all other electrical functions (such as sanders and electric-type windshield wipers) shall be provided with independent and properly protected circuits.

   e. Each body circuit shall be coded by number or letter and diagram of circuits shall be attached to the body in readily accessible location.

3. A separate fuse or circuit breaker shall be provided for each circuit except starter motor and ignition circuits.

4. All wires within body shall be insulated and protected by covering of fibrous loom (or equivalent) which will protect them from external damage and minimize dangers from short circuits. Whenever wires pass through body member, additional protection in form of appropriate type of insert shall be provided.

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[33]485 Lexington Avenue, New York, New York 10017.

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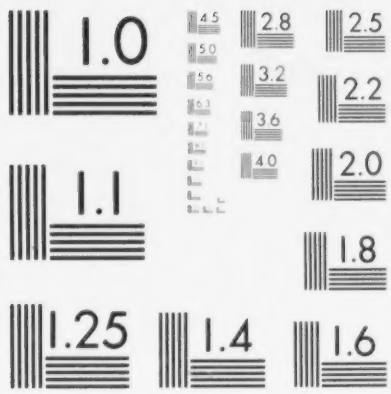

MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

5. Wires not enclosed within body shell shall be fastened securely at intervals of not more than 24 inches. All joints shall be soldered or joined by equally effective connectors.

Exception – small vehicles

Wiring shall be manufacturer's standard.

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APPENDIX

National School Bus Chrome

The color known as National School Bus Chrome was designated as such by the 1939 National Conference on School Bus Standards. The National Bureau of Standards of the U. S. Department of Commerce assisted in developing this color and its colorimetric specifications, as follows:

C.I.E. Chromaticity coordinates		Daylight reflectance Y (%)			Dominant wavelength (in millicrons)			Excitation purity P (%)		
x	y	max.	std.	min.	max.	std.	min.	max.	std.	min.
.5211	.4549	–	41.	40.	584.5	583.5	582.5	–	93.7	89.0

Available from the General Services Administration, Specification Sales, Building 197, Washington Navy Yard, Washington, D. C. 20407, are copies of Federal Specification TT-E-489e entitled Enamel, Alkyd, Gloss, (for Exterior and Interior Surfaces). This document gives technical requirements; sampling, inspection, and test procedures; preparation for delivery instruction; and other information needed by paint manufacturers supplying specific colors of paint.

Formula for Calculating Power and Gradeability

$$G = \frac{33750 \times H.P.}{G.V.W. \times M.P.H.} - 1.5$$ (for buses having seating capacity up to and including 67 pupils)

or

$$- 1.2$$ (for buses having seating capacity of 68 or more pupils)

Where G = Grade in percent

H.P. = Certified net horsepower delivered at road speed (M.P.H.)

G.V.W. = Gross vehicle weight (see table, page 26)

M.P.H. = Miles per hour vehicle is driven

Rolling Resistance = 1.5 or 1.2 (depending on seating capacity of bus)

National Conference on School Transportation

NEA Education Center, Washington, D. C. May 4-7, 1970

Co-sponsored by:

American Association of School Administrators
Association of State Directors of Pupil
Transportation Services
Council of Chief State School Officers
Florida State Department of Education
National Commission on Safety Education, NEA
Rural Education Association
U. S. Office of Education

Administered by

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* A Committee authorized by the 1964 National Conference on School Transportation and elected by state directors of school transportation. Purpose of the Committee: to keep abreast of developments and to represent state education agencies in the planning of the 1970 National Conference.

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National Education Association
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